

### 3.3.2 Pacific staghorn sculpin *Leptocottus armatus*



Distribution map for adult Pacific staghorn sculpin

**Adult Range:** From San Quintin Bay, Baja, California to Chignik, Alaska in the southern Bering Sea.

**Life History:** Size: commonly less than 254 mm (10 in.); Age at maturity: approximately one year old; Fecundity: 2,000 to 11,000 eggs; Life span: maximum age unknown.

**Adult Habitat:** Lower reaches of bays and estuaries; shallow muddy and silty substrates; intertidal to depths of 91 m (300 ft).

**Adult Fishery:** Recreational; common catch from piers, used as bait, primarily in striped bass fishery. Commercial; by-catch in trawl fishery, small bait-fish market.

The Pacific staghorn sculpin belongs to the family Cottidae, a large group (more than 300 species) of bottom-dwelling fishes (Nelson 1994). Pacific staghorn sculpin range from San Quintin Bay in northern Baja California to Chignik, Alaska in the southeastern Bering Sea (Miller and Lea 1972). In the southern half of their range they commonly occur in freshwater (Moyle 1976). Pacific staghorn sculpin were collected during all Morro Bay fish studies (Fierstine et al. 1973, Horn 1980, Behrens and Sommerville 1982, CDFG unpubl. otter trawl data, 1999-2000 impingement study [Section 4.0]).

The Pacific staghorn sculpin is classified as a non-dependent marine fish, meaning that although commonly found in estuarine environments, it does not require this habitat type to complete its life cycle (Moyle and Cech 1988). Pacific staghorn sculpin are usually found in shallow subtidal waters, but may be found as deep as 91 m (300 ft). They commonly burrow into the sandy mud bottoms of bays and estuaries leaving only their

head and eyes exposed. They are occasionally found in the lower reaches of freshwater streams.

Spawning takes place from October through April, peaking in January and February. Spawning locations tend to be shallow coastal bays, inlets, sounds, and sloughs (Jones 1962). The spawning substrata varies from mud and sand bottoms to more firm rocky areas. The females spawn only once per season. After spawning, the adults leave the shallow spawning areas for deeper offshore waters (Tasto 1975). Eggs hatch in about ten days and the larvae (averaging 4.5 mm [0.2 in.] in length) swim to the surface, becoming planktonic (Jones 1962). Wang (1986) suggested that the larvae might remain on the bottom for a short period of time before they ascend to the surface. It takes approximately eight weeks from hatching until larvae metamorphose into juveniles at a length of 15 to 20 mm total length (TL; 0.6 to 0.8 in.; Matarese et al. 1989). While Matarese et al. (1989) reported that it took approximately eight weeks from the time of hatching until the larvae metamorphosed into juveniles, at a length of 15 to 20 mm (0.6 to 0.8 in.) TL, the time period that the larvae are subject to entrainment appears to be considerably less.

Juvenile Pacific staghorn sculpin recruit to shallow inshore waters and sloughs. It has been reported that juveniles move up estuaries and into freshwater and remain there for about three months before moving to a more saline environment (Moyle 1976, Love 1996). The prey of Pacific staghorn sculpins includes amphipods, nereid worms, and small anchovy (Jones 1962).

### **3.3.2.1 Pacific Staghorn Sculpin Results**

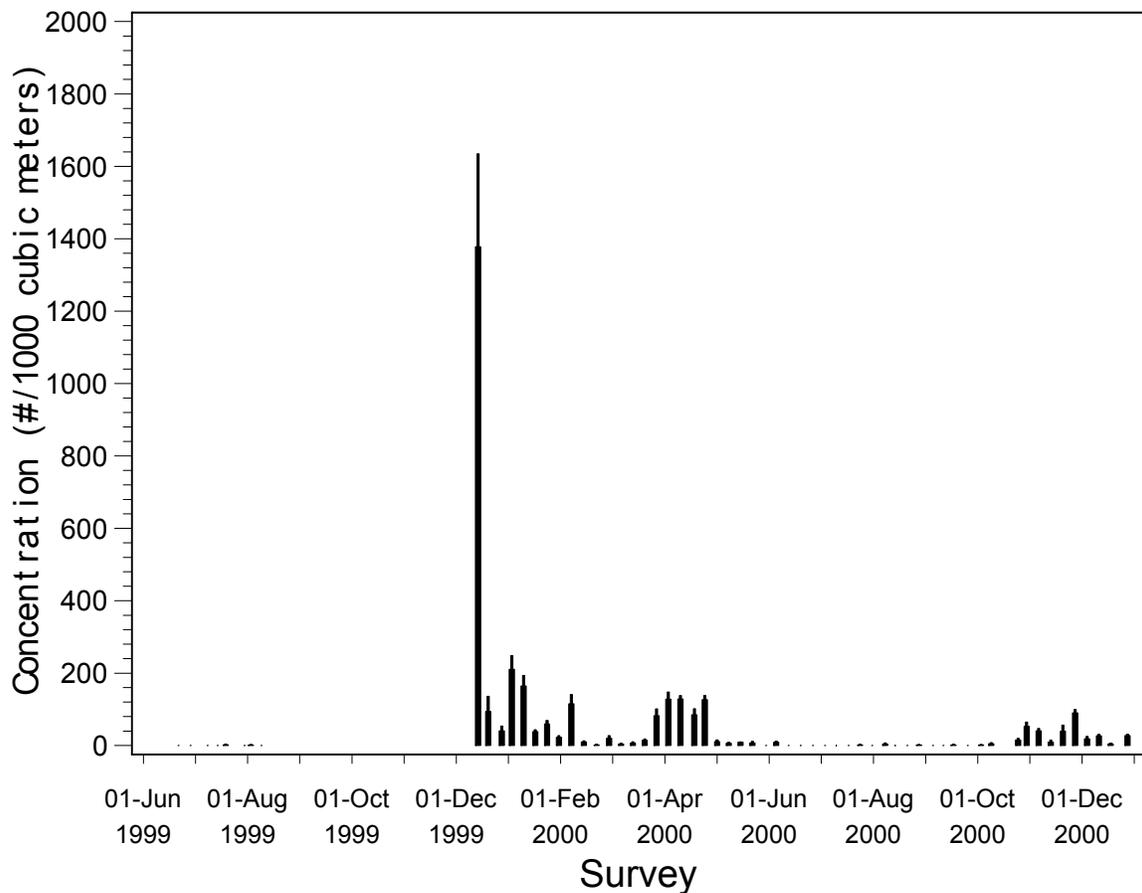
Pacific staghorn sculpin larvae were collected at the MBPP intake station every month, with a marked peak in December 1999 (Figure 3-12). This suggests that incubation times could be on the order of a month or two for this species, given the start of spawning activity in October as reported by Moser (1996). They were collected at the MBPP intake station at a much lower rate during December 2000 as compared with the same month of the previous year.

The length frequency distribution for a representative sample of Pacific staghorn sculpin larvae showed a relatively wide size range of 3.3 to 9.9 mm (0.13 to 0.38 in.) with an average size of 7.5 mm (0.3 in.) (Figure 3-13). While a group of smaller larvae were collected, most of the larvae were in the 8 to 9 mm (0.31 to 0.35 in.) range in the bimodal frequency distribution. This distribution may verify the findings of Wang (1986) that the larvae may remain on the bottom for a short period of time before they ascend to the

surface and are subject to entrainment. The smaller larvae in the samples were close to hatch size and may have represented larvae that were trapped in tidal currents immediately after hatching and as a result were exposed to entrainment.

Larval Pacific staghorn sculpin abundance at each of the five sampling locations varied from month to month (Figure 3-14). Their abundance in Estero Bay was consistently lower than at other stations within Morro Bay except in October and December 2000. At stations inside Morro Bay, Pacific staghorn sculpin larvae were slightly more abundant at stations nearer the harbor mouth when compared with Station 4 in the more protected, southern area of Morro Bay during January through June. Pacific staghorn sculpin larvae were more common inside of Morro Bay than at Station 5 (Estero Bay).

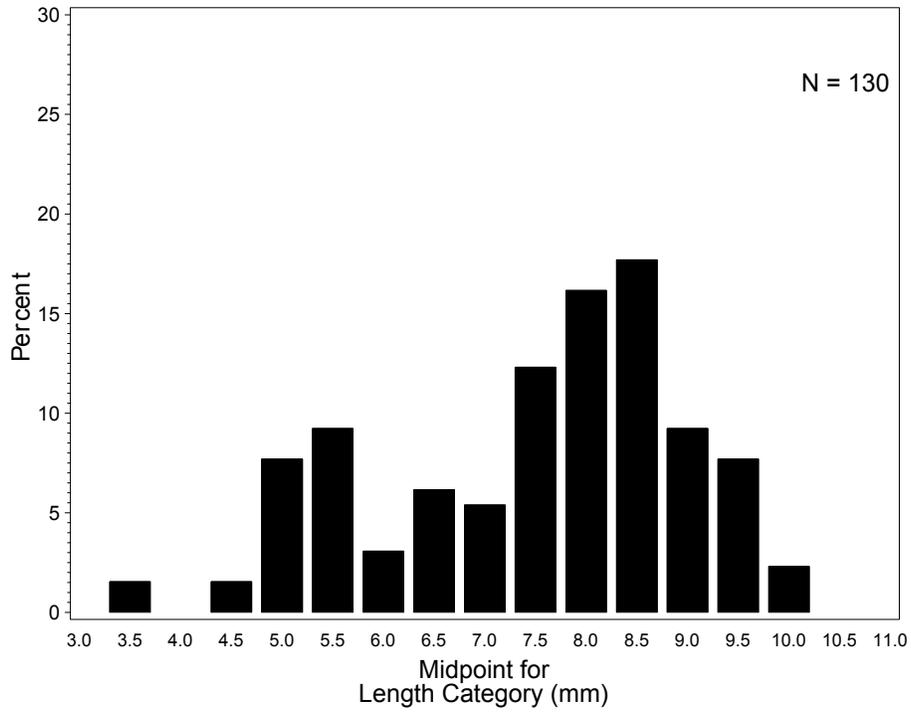
Concentration ( $\#/m^3$ ) of larval Pacific staghorn sculpin was compared among stations for collections made at ebb and flood tides (Figure 3-15). Their abundances at the sampling locations do not appear to be related to tidal current.



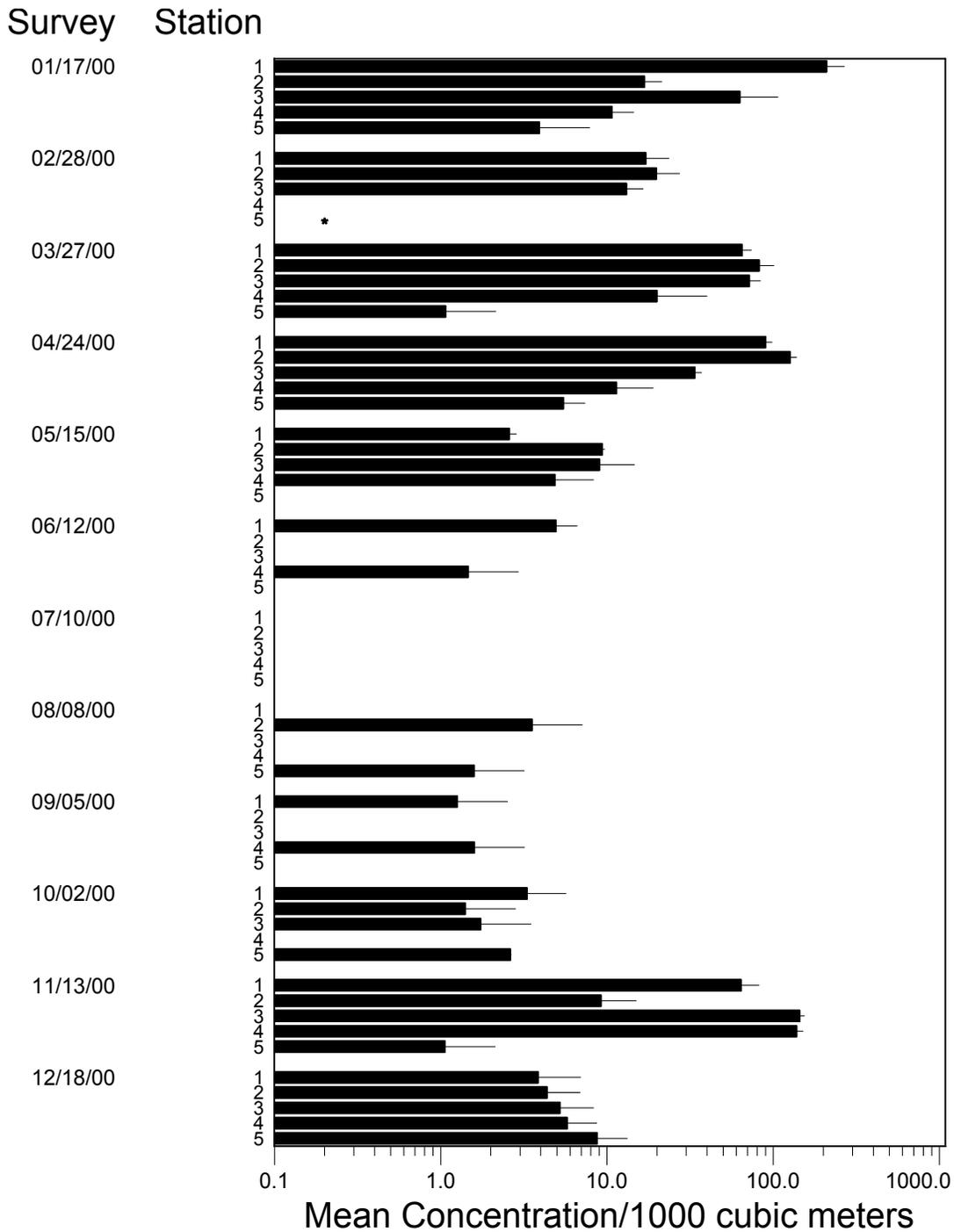
**Figure 3-12.** Weekly survey mean concentrations of larval Pacific staghorn sculpin collected at the MBPP intake station with standard error indicated (+1 SE). Weekly

surveys were collected from June 21 through August 10, 1999 and from December 14, 1999 through December 29, 2000.

Note: The October 16, 2000 survey was cancelled due to the unavailability of a boat.



**Figure 3-13.** Length frequency distribution (mm) for larval Pacific staghorn sculpin collected at the MBPP intake station from January – December 2000. The frequency distribution is based on the lengths of a representative sample of approximately 100 larvae.

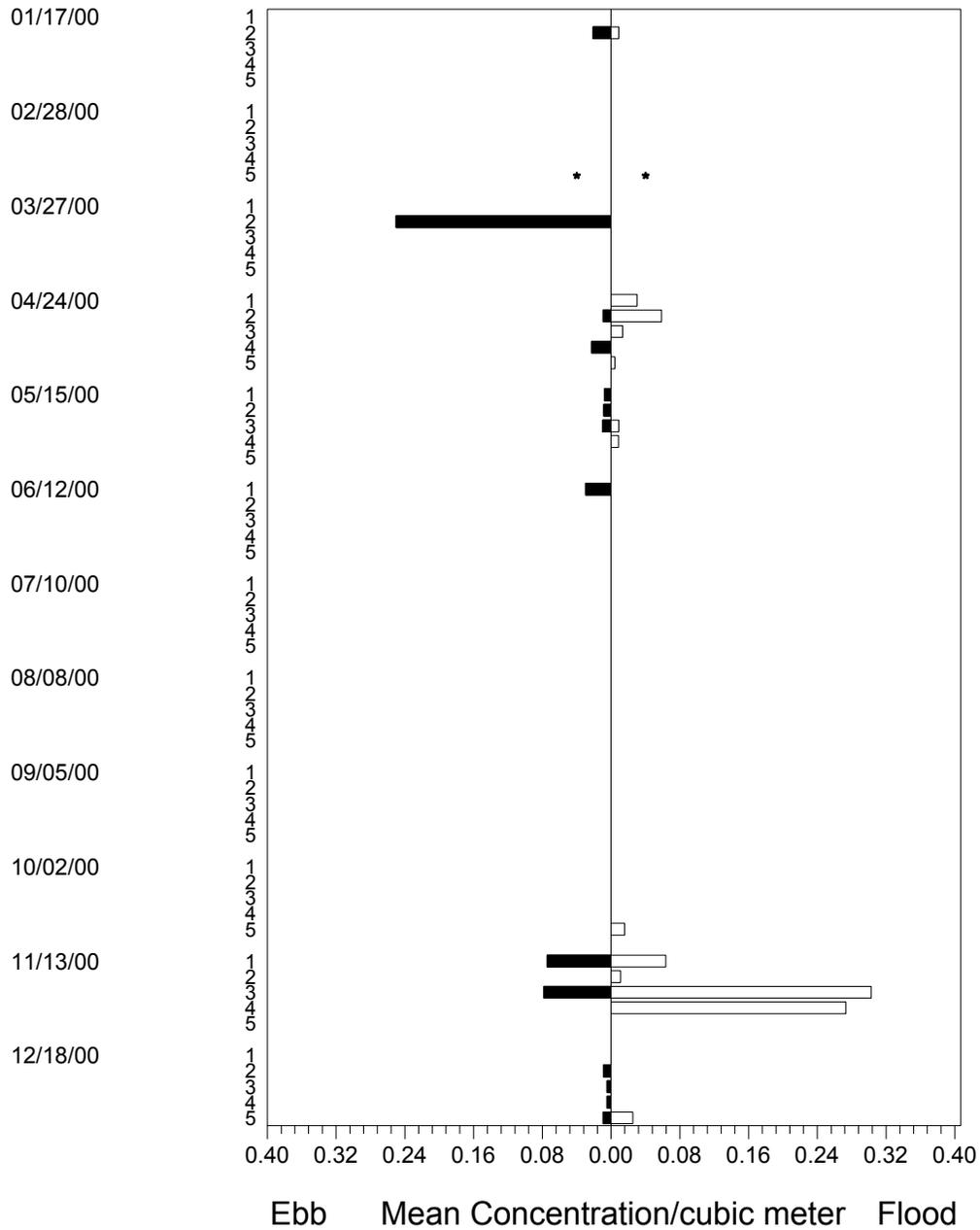


**Figure 3-14.** Mean larval Pacific staghorn sculpin concentration in monthly paired surveys at the MBPP intake (Station 2), Morro Bay source water (Stations 1, 3, and 4), and Estero Bay (Station 5) from January – December 2000 with standard error indicated (+1 SE).

Note: During the January 17, 2000 survey, source water stations 1, 3, 4, and 5 were sampled only in daylight hours. Beginning in February 2000 the sampling frequency was increased to cover a 24-hour period.

\* Estero Bay Station 5 could not be sampled in February 2000 due to unsafe sea conditions.

Survey Station



**Figure 3-15.** Mean concentration of larval Pacific staghorn sculpin from monthly paired surveys by tidal current (ebb – solid bars; flood – clear bars) and sampling station (Morro Bay stations 1–4 and Estero Bay Station 5) from January – December 2000.

Note: During the January 17, 2000 survey, source water stations 1, 3, 4, and 5 were sampled only in daylight hours. Beginning in February 2000 the sampling frequency was increased to cover a 24-hour period.

\*Estero Bay Station 5 could not be sampled in February 2000 due to unsafe sea conditions.